Detection of Coronavirus-like Particles from Mink with Epizootic Catarrhal Gastroenteritis

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ABSTRACT

Coronavirus-like particles have been detected by electron microscopy in fecal samples from naturally occurring cases of epizootic catarrhal gastroenteritis (ECG) of mink. Preliminary transmission trials with bacteria-free filtrates from mink with ECG suggested that a coronavirus plays a role in the disease syndrome.

RÉSUMÉ

Des particules virales s'apparentant aux virus corona ont été observées par microscopie électronique dans des fecès de visons souffrant de la gastroentérité catarrhale épizootique. Des essais préliminaires de transmission de la maladie à partir de filtrate de fèces exempts de bactérie démontrent la possibilité qu'un virus de type corona pourrait être un agent responsable de ce syndrome chez le vison. ***(Traduit par Dr Pascal Dubreuil).***

Over the past four years, we have observed outbreaks of epizootic catarrhal gastroenteritis (ECG) in mink from which structures compatible with coronaviruses have been revealed by negative contrast electron microscopy of the intestinal contents (Fig. 1). Briefly, the disease appears with greater frequency in mink four months and older (1,2). The mink become anorexic and exhibit a mucoid diarrhea over a two to six day course. There appears to be a genetic predilection as the prevalence of ECG is highest in dark colored mink. The mortality from ECG is low (< 5%) unless complicated with a concurrent infection with Aleutian disease virus and/or bacterial infections.

Since ECG was first reported in 1975 (1), by Larsen and Gorham, several million mink have been affected in North America, Scandinavia, USSR and China. Because of the period of time the mink are anorexic with consequent loss of body condition and pelt quality, the disease is of economic concern to mink producers. The disease has a seasonal occurrence (early fall during molting and occasionally up to the time of pelting) (2). If ECG occurs during the period from parturition to weaning, nursing kittens may die of starvation.

The epizootiology of ECG has suggested a viral etiology for a number of years. Rotavirus-like particles were observed in mink feces from Denmark in 1980 (3). A recent report from China (Dr. Yin Zhen, Changchun Veterinary University, Changchun City, Jilin, People's Republic of China, personal communication, 1989) described ten outbreaks of ECG which occurred in 1987, and electron microscopy suggested that coronavirus may be the etiological agent. More recently, Dr. David Alstad, North Dakota Veterinary Science Diagnostic Laboratory, North Dakota State University, Fargo, North Dakota (personal communication, 1989), corroborated our electron microscopic findings of coronavirus-like particles detected in fecal contents from mink obtained from three separate outbreaks of ECG in Wisconsin.

In addition to the detection of coronavirus-like particles in fecal samples from naturally occurring cases of ECG, we have conducted preliminary transmission experiments in which eight seven month old mink kits, which were either fed or inoculated intraperitoneally with bacteria-free filtrates (0.22 μm) of fecal matter derived from mink with signs of ECG, and observed for the subsequent occurrence of clinical signs and fecal shedding of virus-like particles. The exposed mink all showed clinical signs within two to three days with 100% morbidity and no fatalities throughout the eight week observation period. The fecal samples were screened for bacteria and viruses at daily intervals for the first seven days, then every third day for the duration of the experiment. Viral structures consistent with coronavirus-like particles were observed by electron microscopy within two to three days and persisted for a period of two weeks after exposure. No pathogenic bacteria were isolated during the course of the study. Viral structures consistent with rotavirus, parvovirus and calicivirus were not detected in the studies reported herein. It should be pointed out that coronavirus-like particles can occasionally be demonstrated in feces collected from apparently normal mink, indicating that a subclinical carrier condition may exist similar to that reported for other species (4-7).

Based upon the epizootiology of the enteric viruses in other species, including the canine, there appears to be a synergistic effect between coronaviruses and rotaviruses or parvoviruses (8, 9). Although further studies are necessary to definitely identify the cause of ECG, we propose that coronaviruses are an important com-

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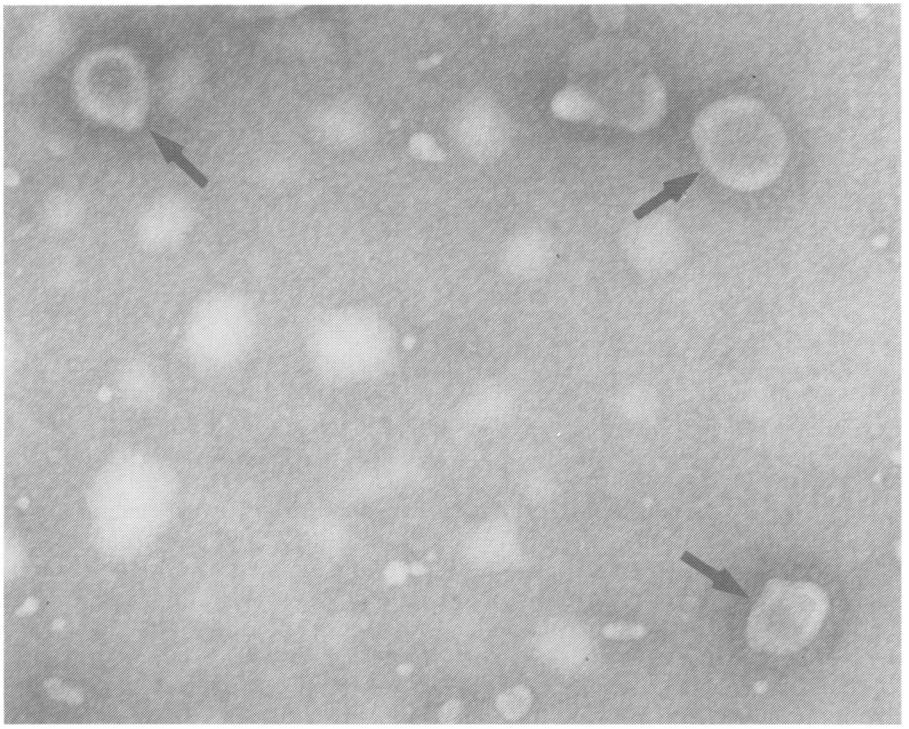

Fig. 1. Electron microscopy of coronavirus-like particles detected in the feces of mink with epizootic catarrhal gastroenteritis. Particles ranged in size from 50 to 200 nm Fringed virion structures are noted with arrows. Negative stained with phosphotungstate acid. Magnification 210,000X.

ponent in the disease process, and that other viruses such as rotavirus, parvovirus and calicivirus may add to the severity of the disease complex (10-12).

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